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(54) MOTORIZED PET LEASH ASSEMBLY

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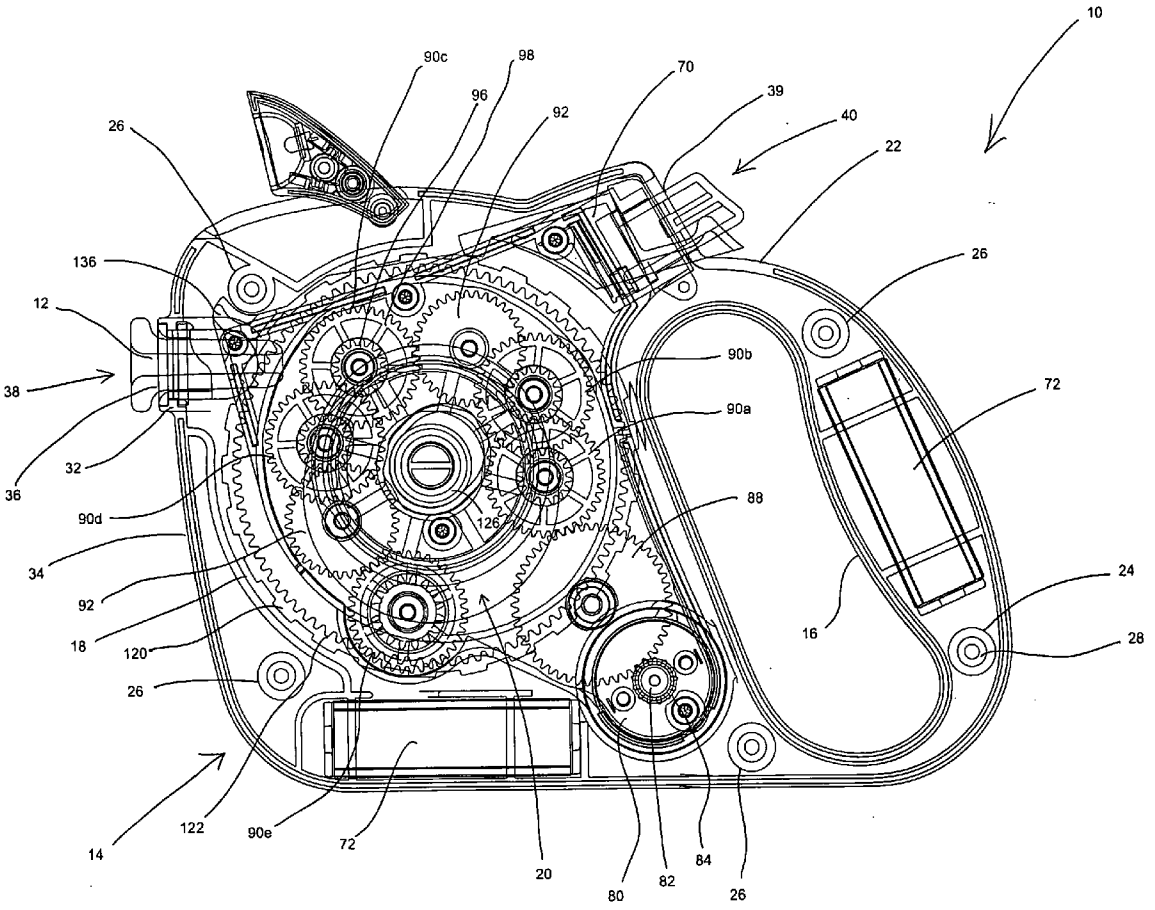
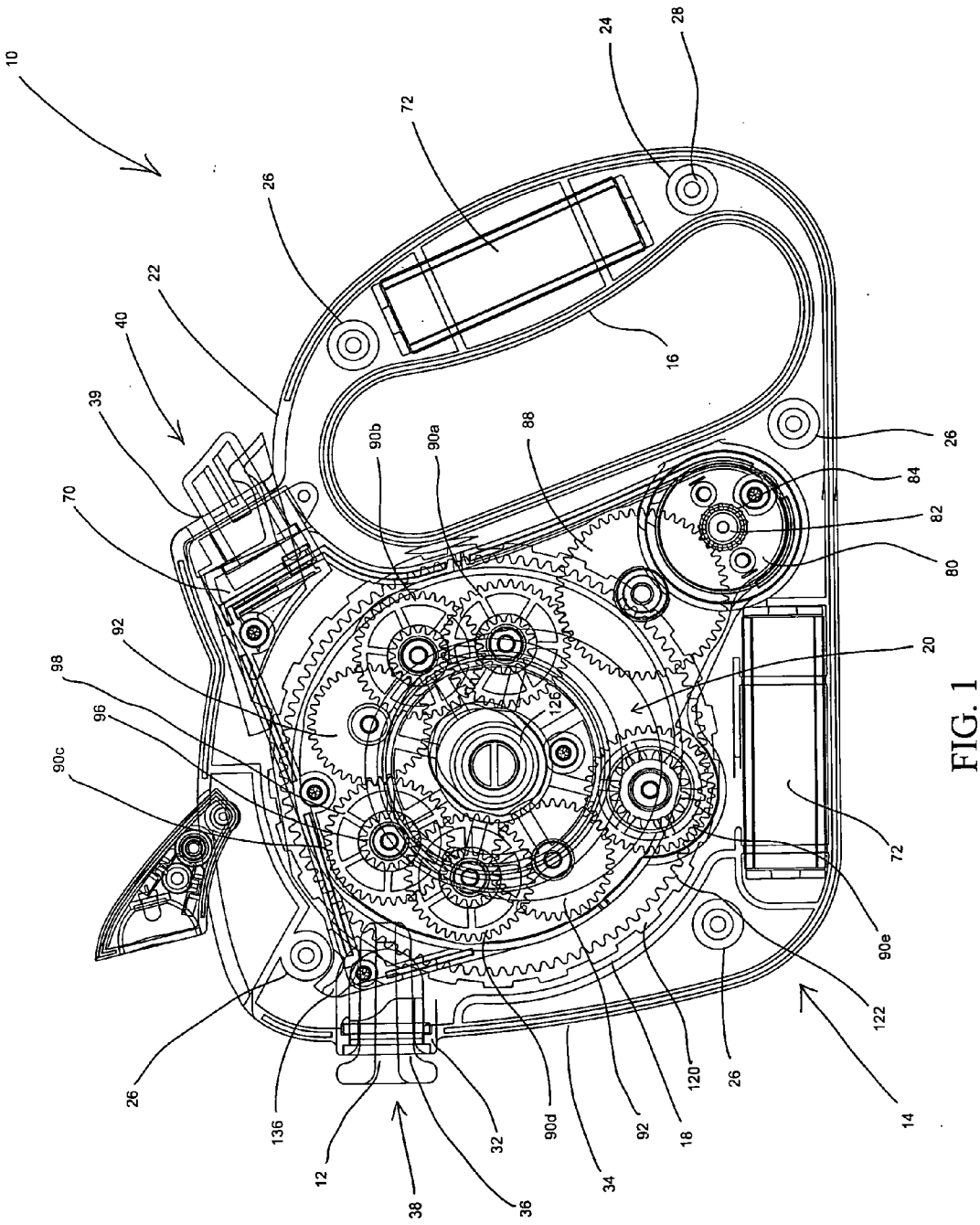
(57) **ABSTRACT**

The present invention relates to a motorized dog leash. The motorized dog leash includes a housing, a battery mounted to the housing, and a motor mounted to the housing and electrically connected to the battery. A gear train is connected to an output shaft of the motor. A spool is rotatably mounted to the housing and engaged with the gear train. A leash is selectively wound on the spool, the leash including a distal end which protrudes from the housing. A trigger selectively actuates the motor to rotate the spool.

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24
28
72
26
22
40
16
39
90b
90a
88
26
84
82
70
80
92
20
98
96
126
90c
72
90e
122
26
136
12
38
32
36
90d
34
92
18
120
26
14

FIG. 1

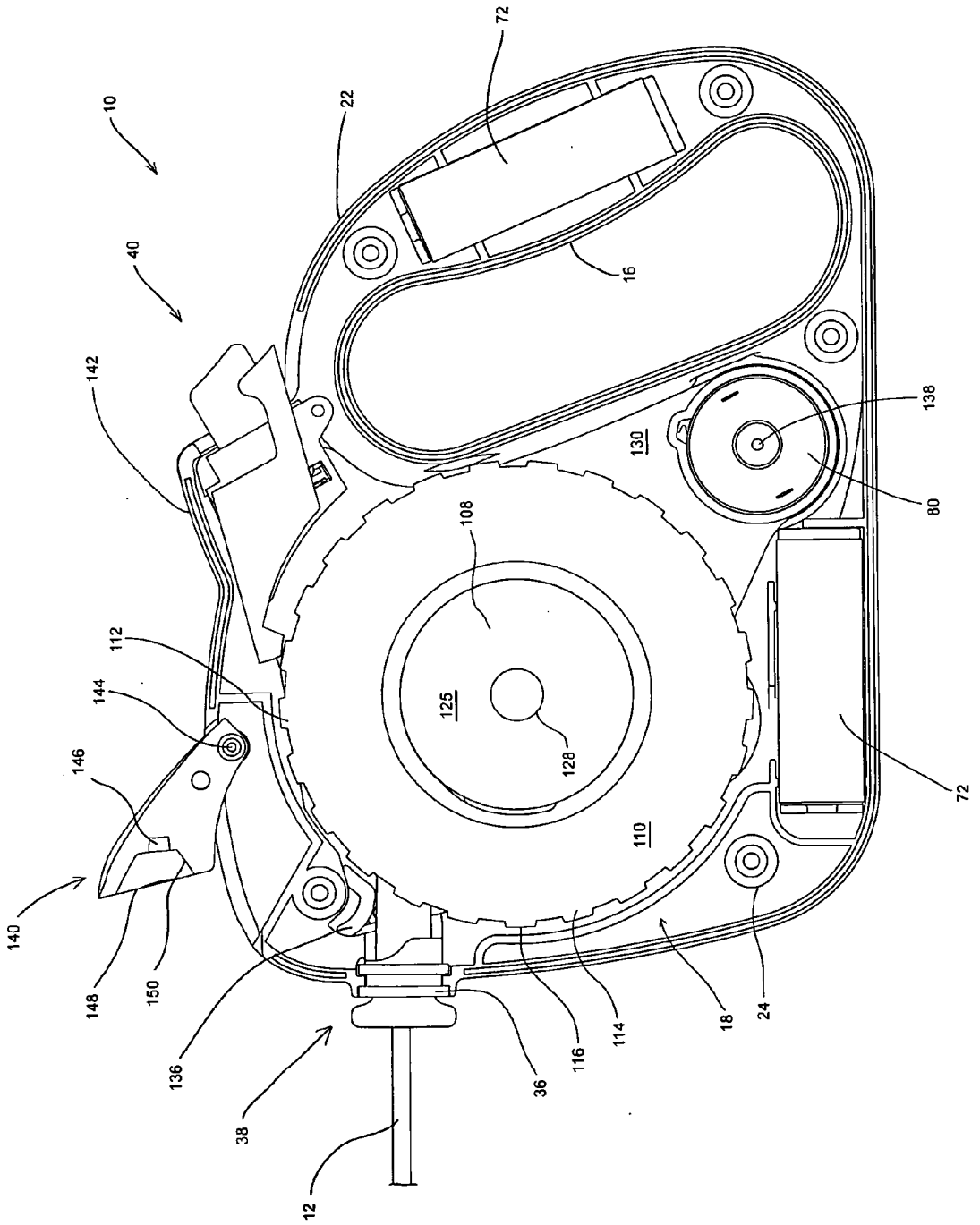

10
22
72
40
16
142
138
130
80
108
112
125
144
128
146
110
72
140
148
150
136
38
12
36
116
114
18
24

FIG. 2A

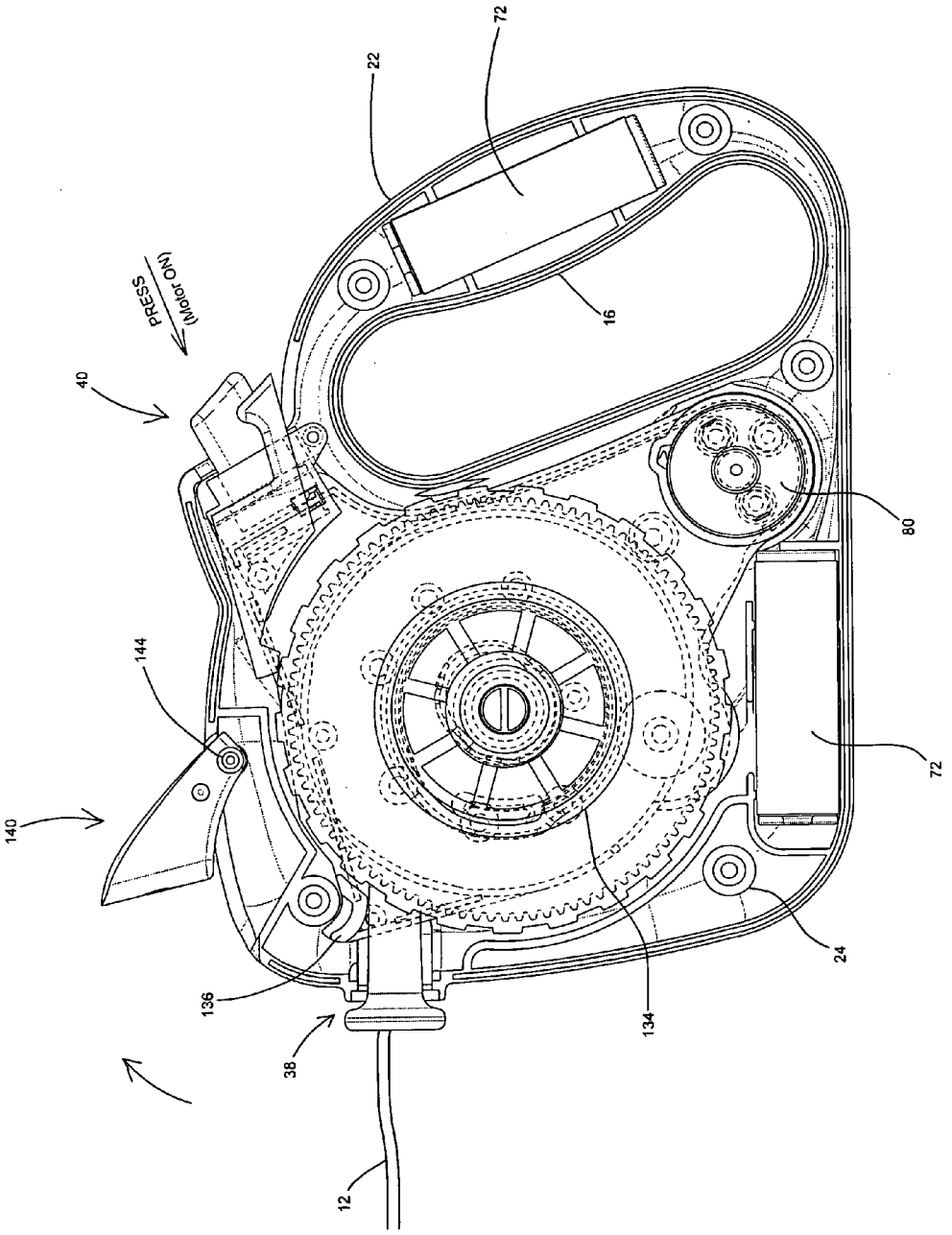


FIG. 2B

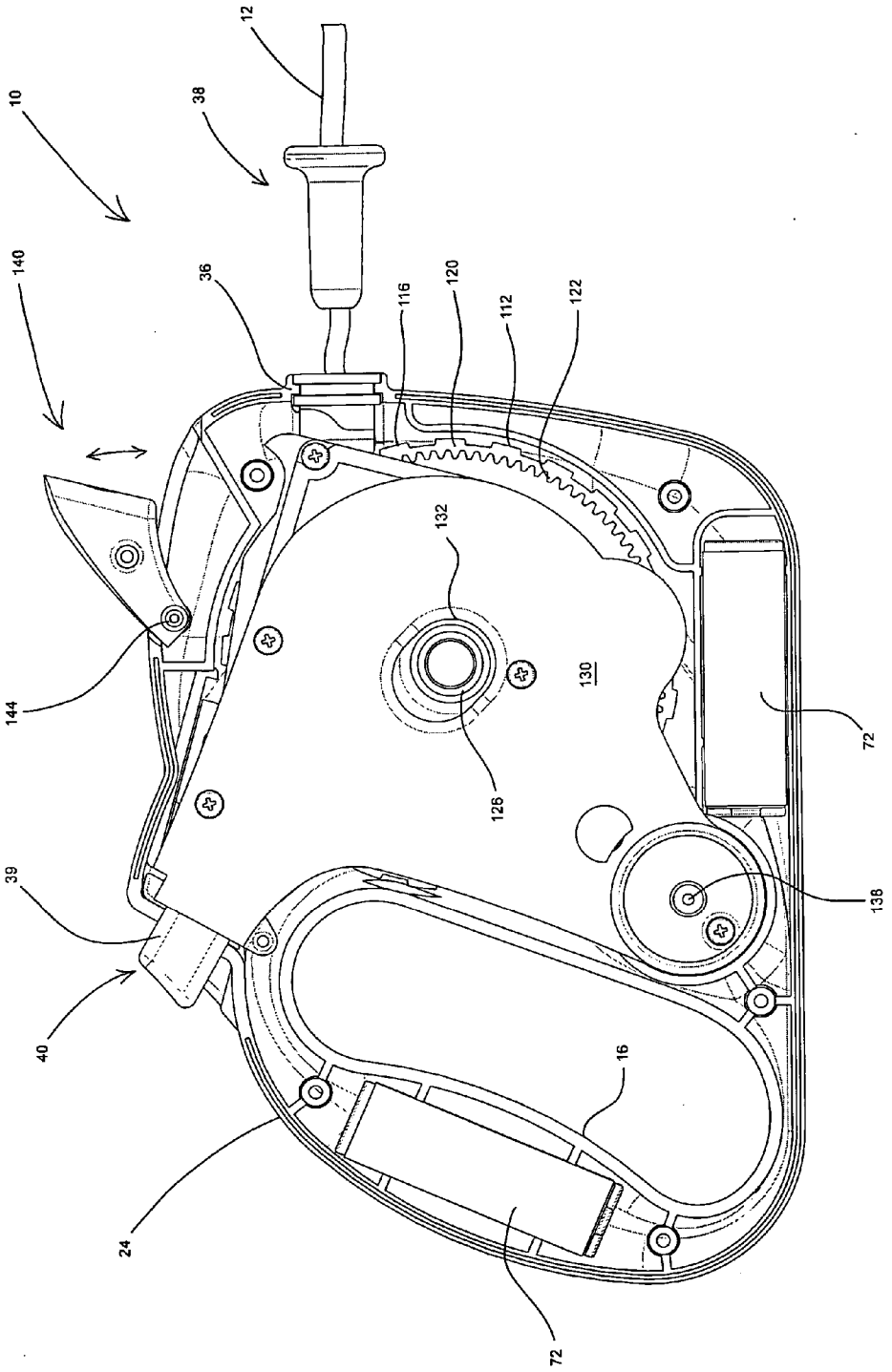

12
10
38
140
36
116
120
112
122
132
130
144
126
72
39
138
40
16
24
72

FIG. 3

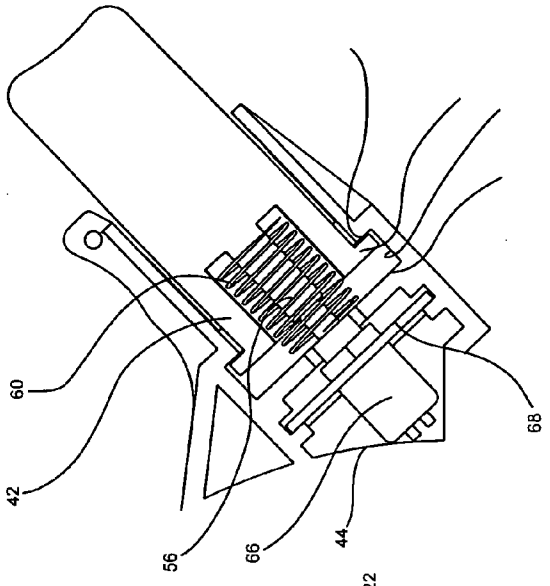


FIG. 4

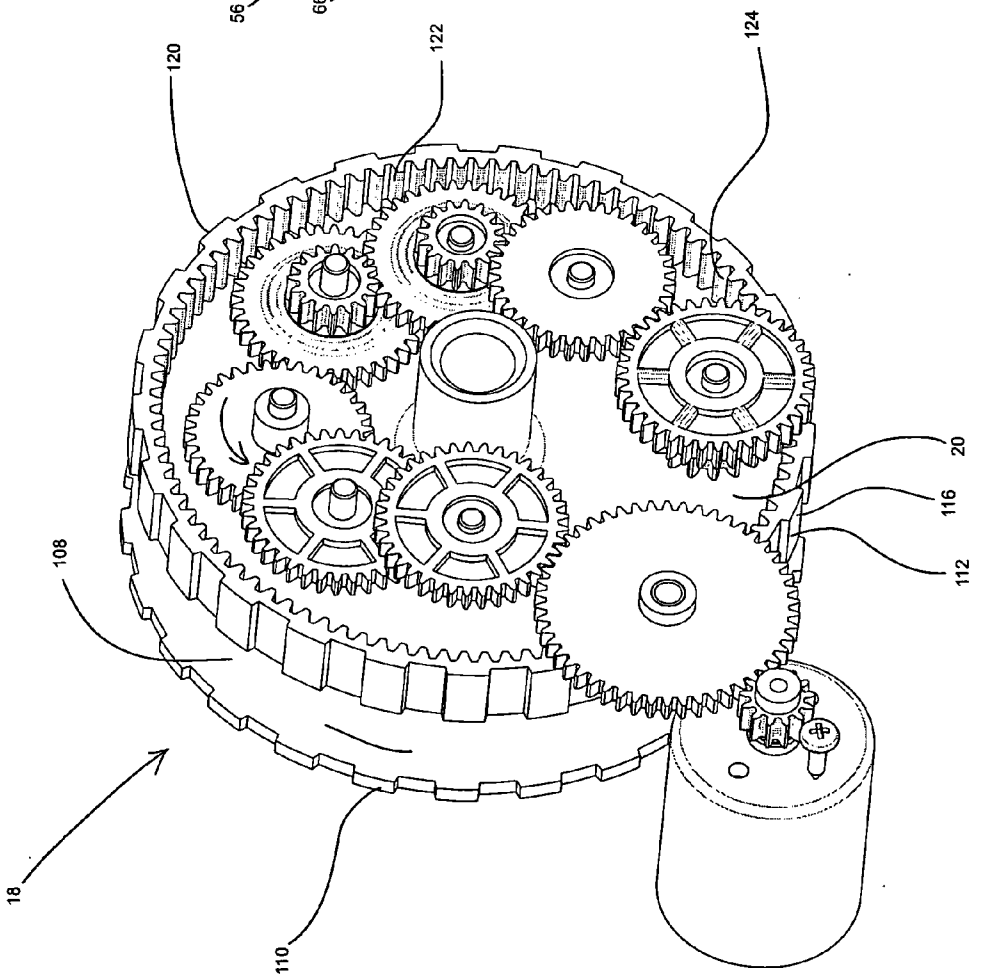


FIG. 5

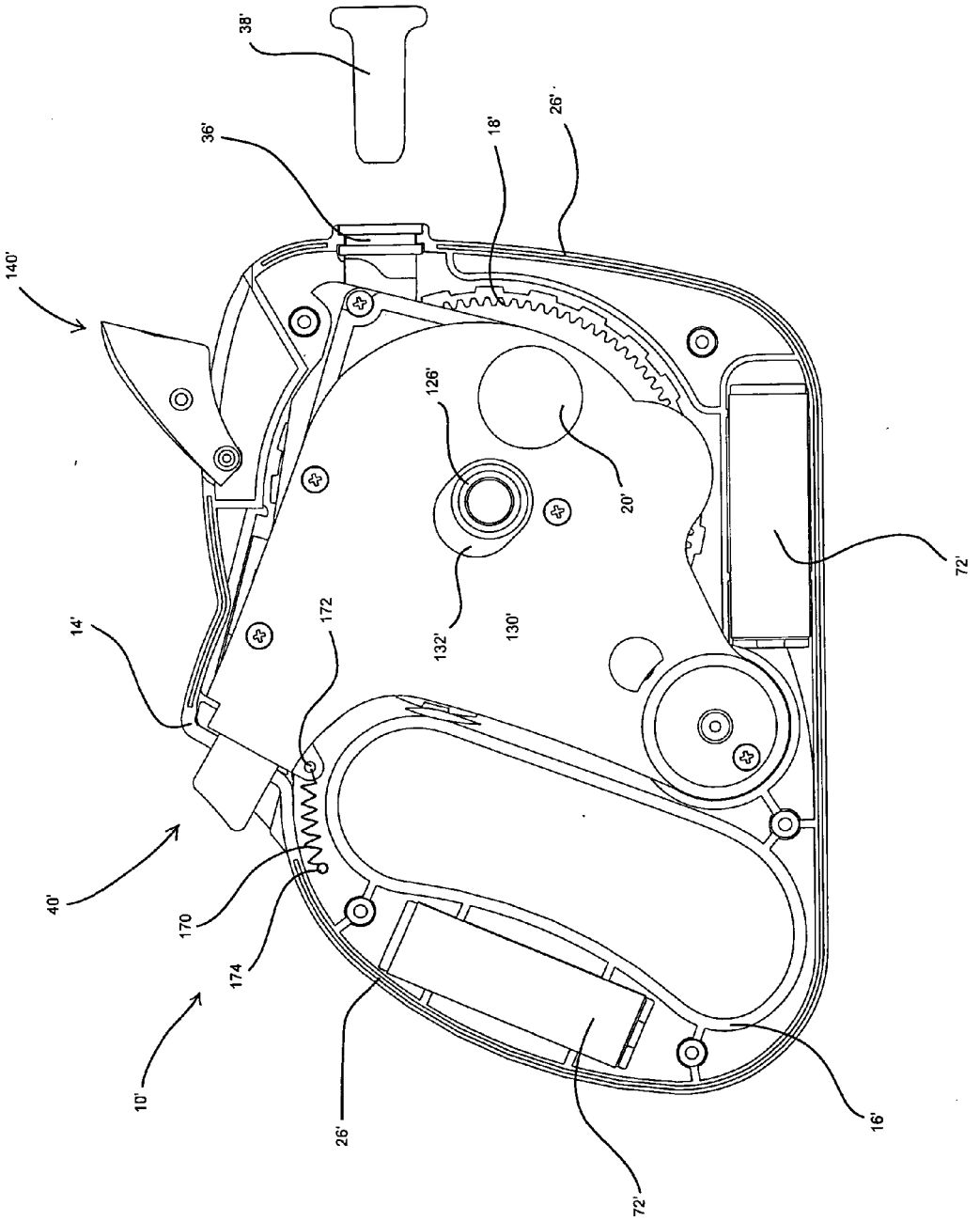


FIG. 6

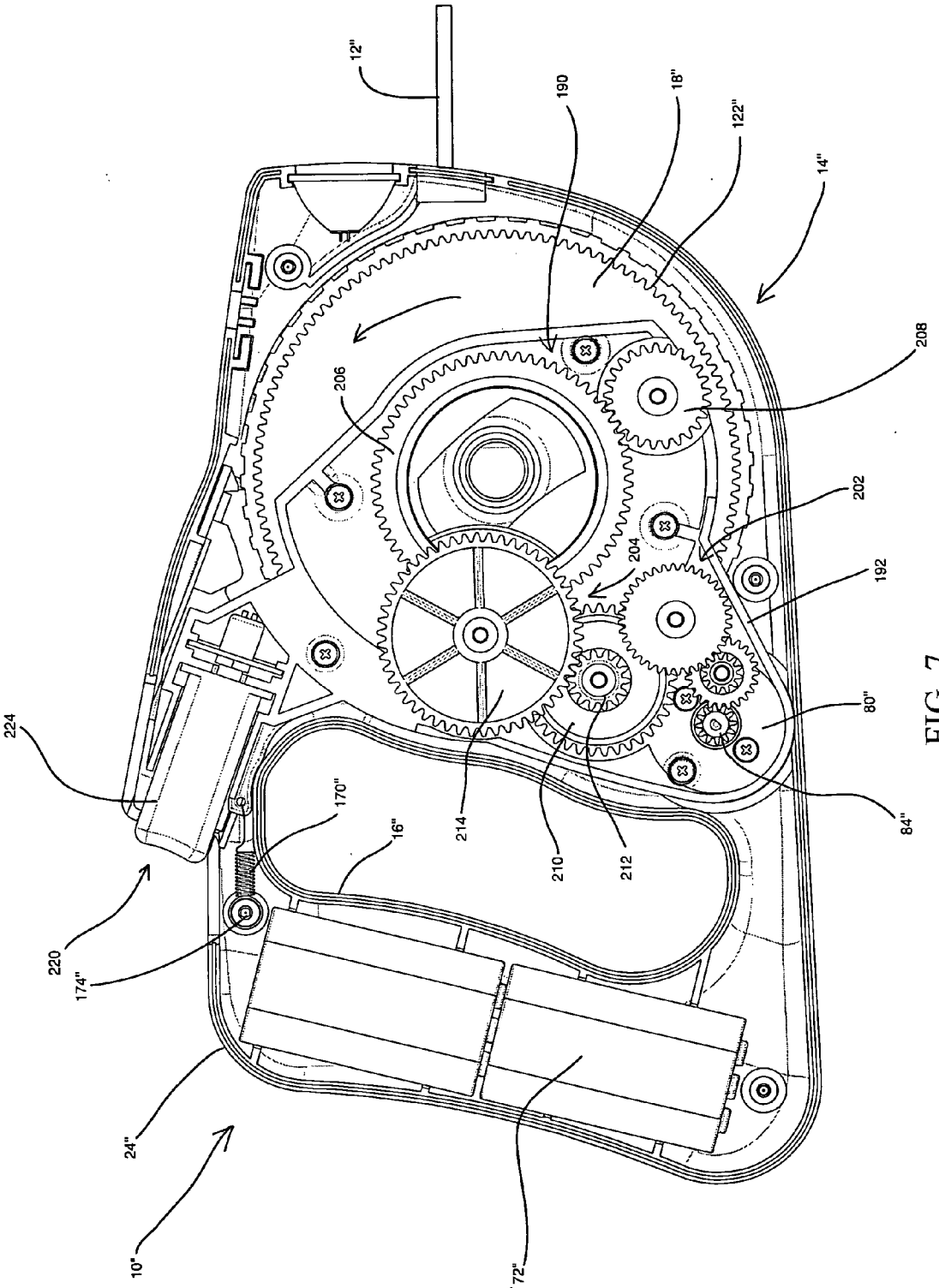

12"
190
18"
122"
14"
208
206
202
204
192
80"
84"
214
210
212
170"
16"
224
220
174"
24"
10"
72"

FIG. 7

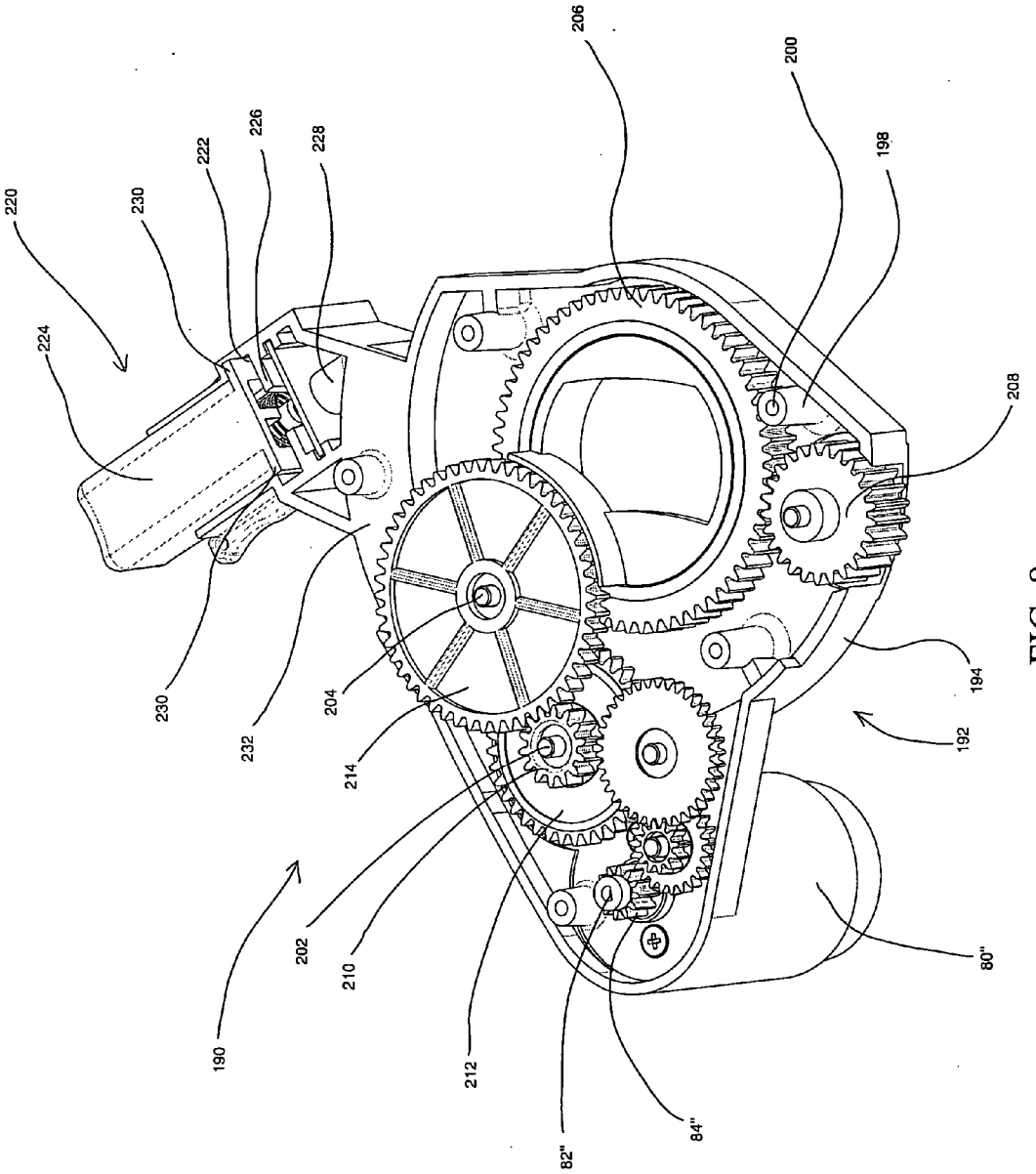

206
200
198
226
228
222
220
230
224
208
230
232
204
214
194
192
202
210
190
212
82"
84"
80"

FIG. 8

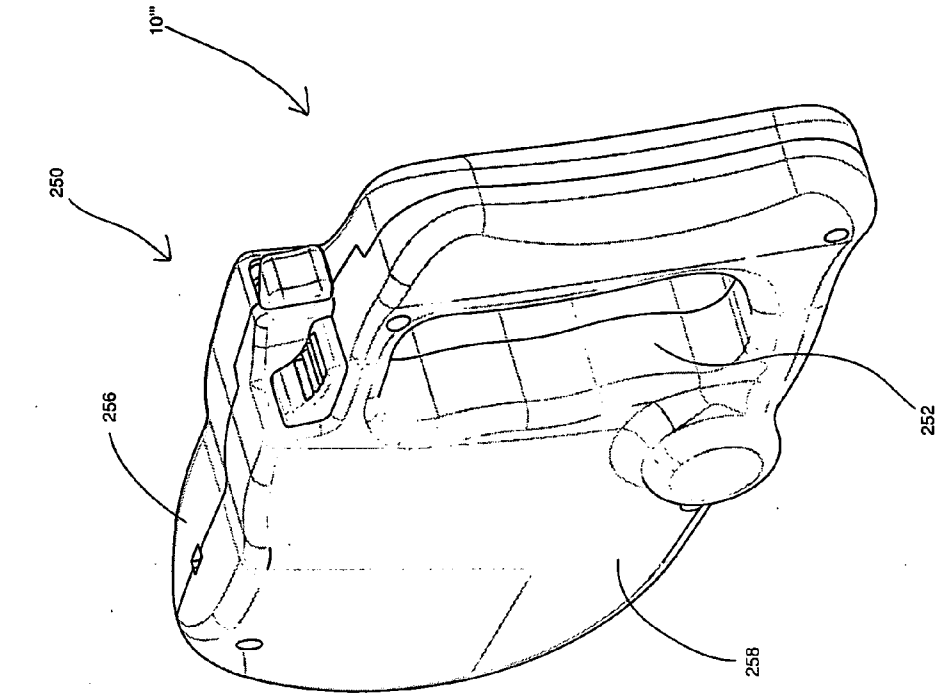


FIG. 10

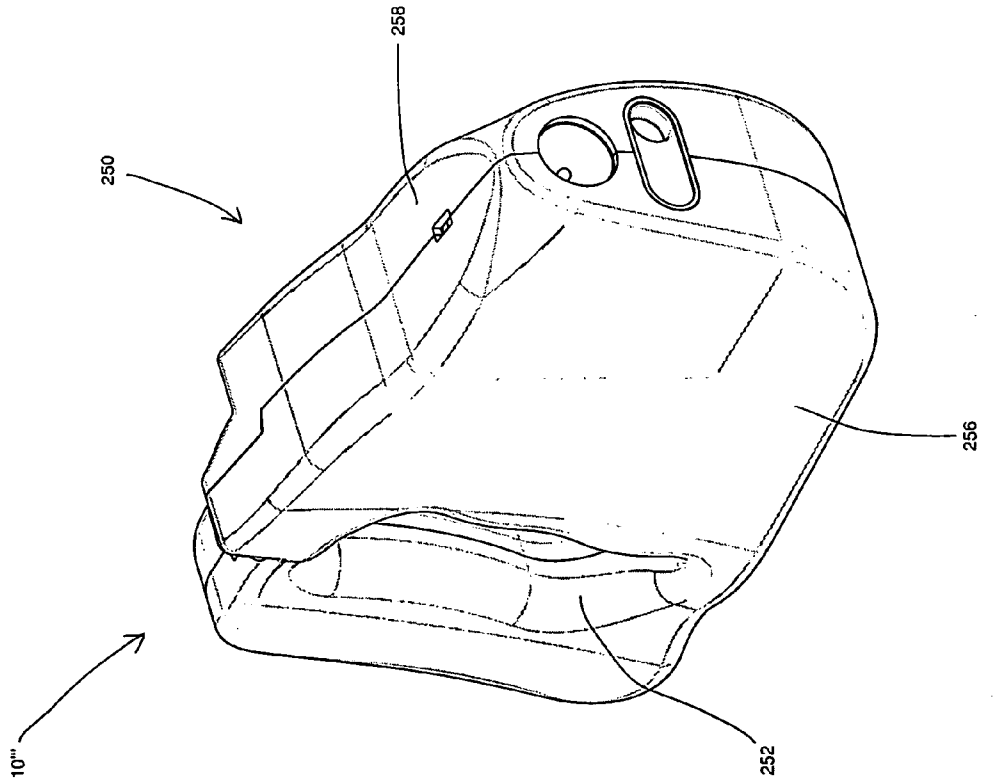
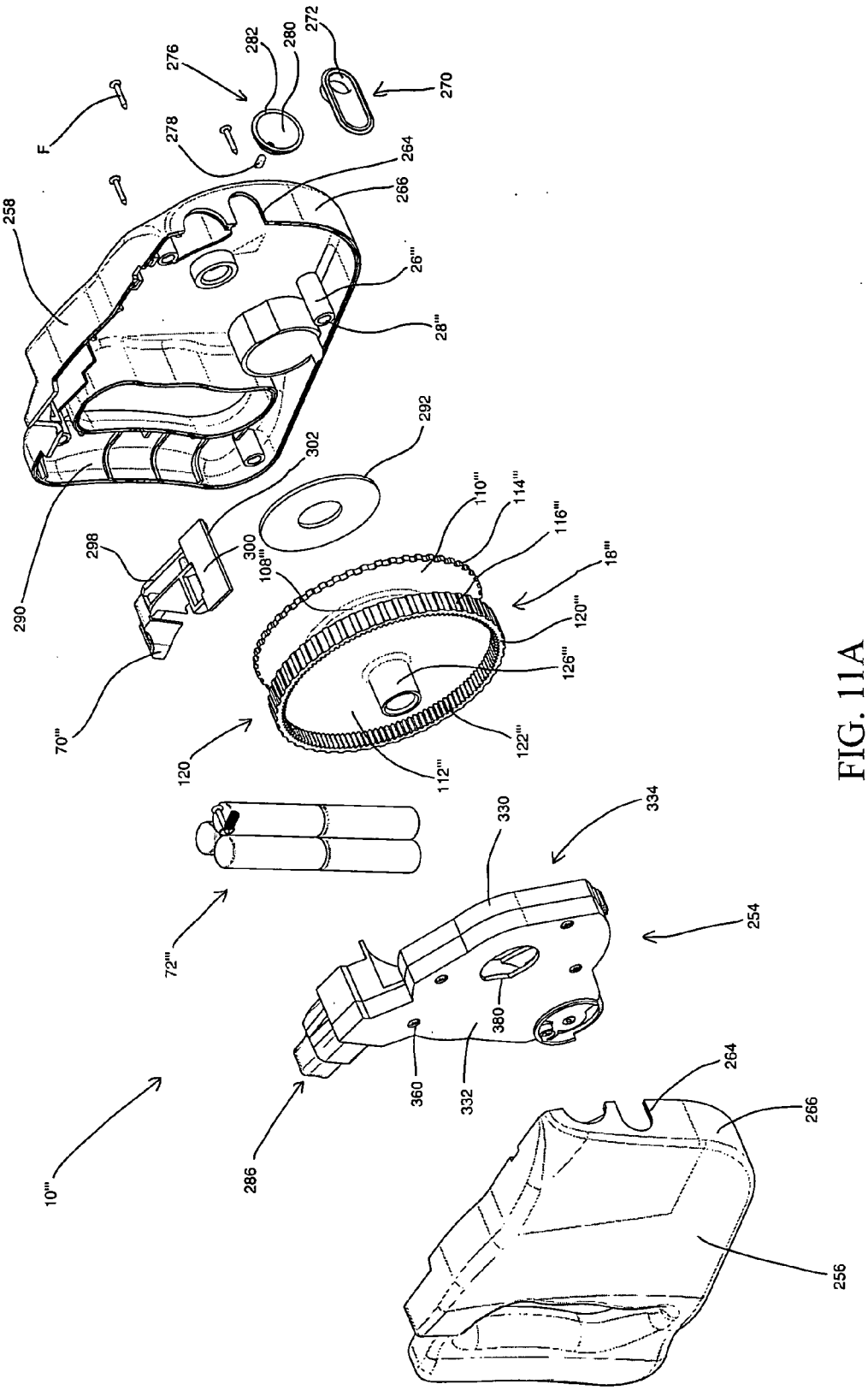


FIG. 9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282
280
272
270
278
264
266
258
26'''
28'''
292
302
290
110'''
114'''
116'''
18'''
298
300
108'''
120'''
126'''
70'''
120
122'''
112'''
334
330
254
72'''
380
360
332
10'''
286
264
266
256

FIG. 11A

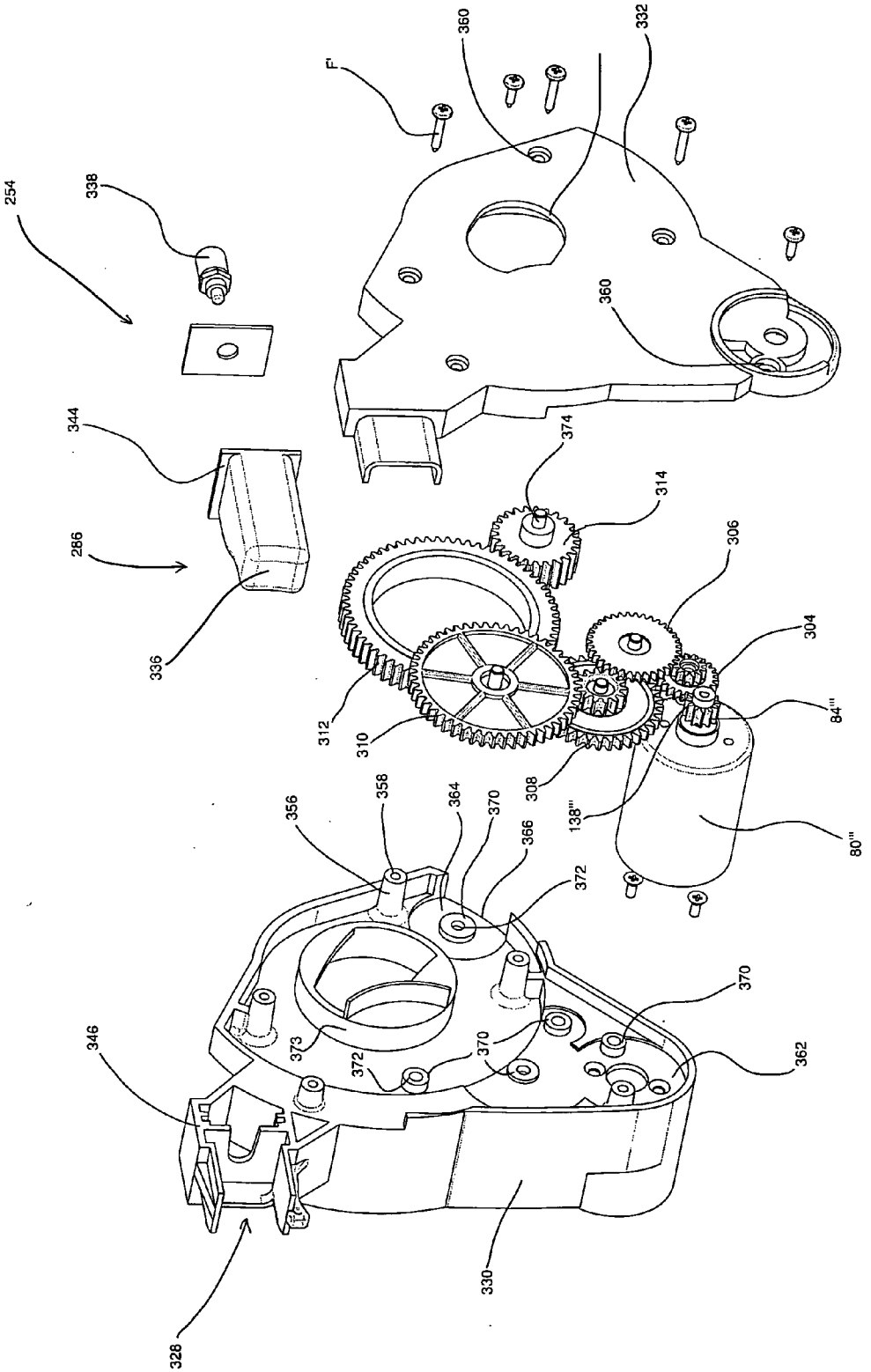
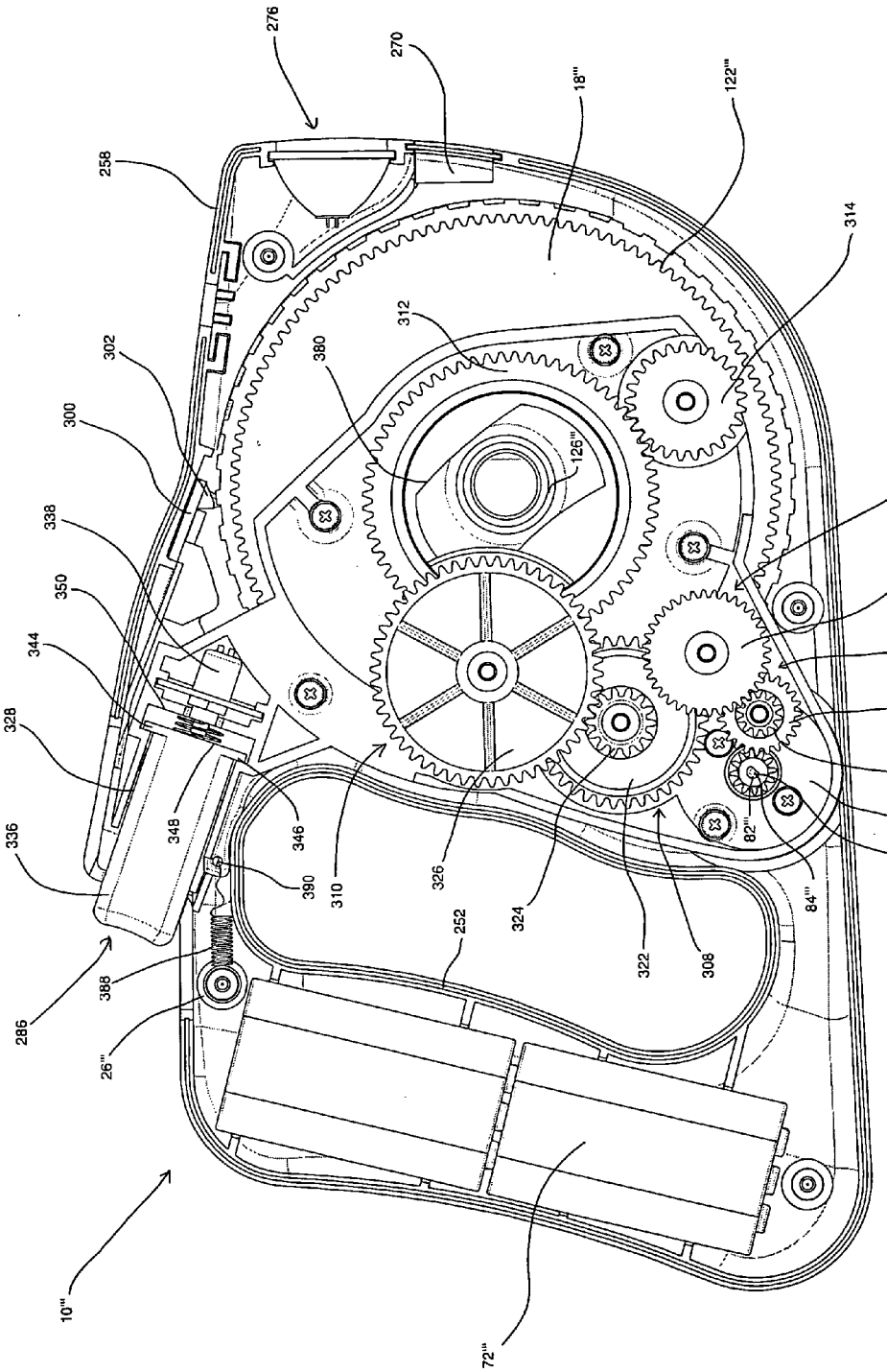

F'
360
332
254
338
360
344
374
314
286
306
304
336
312
310
84'''
308
138'''
80'''
356
358
364
370
366
372
370
346
373
372
370
362
330
328

FIG. 11B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270
18'''
122'''
258
314
312
380
302
300
125'''
306
338
318
350
344
304
328
316
348
346
310
326
324
322
308
318
82'''
80'''
336
390
84'''
136'''
252
388
286
26'''
10'''
72'''

FIG. 12

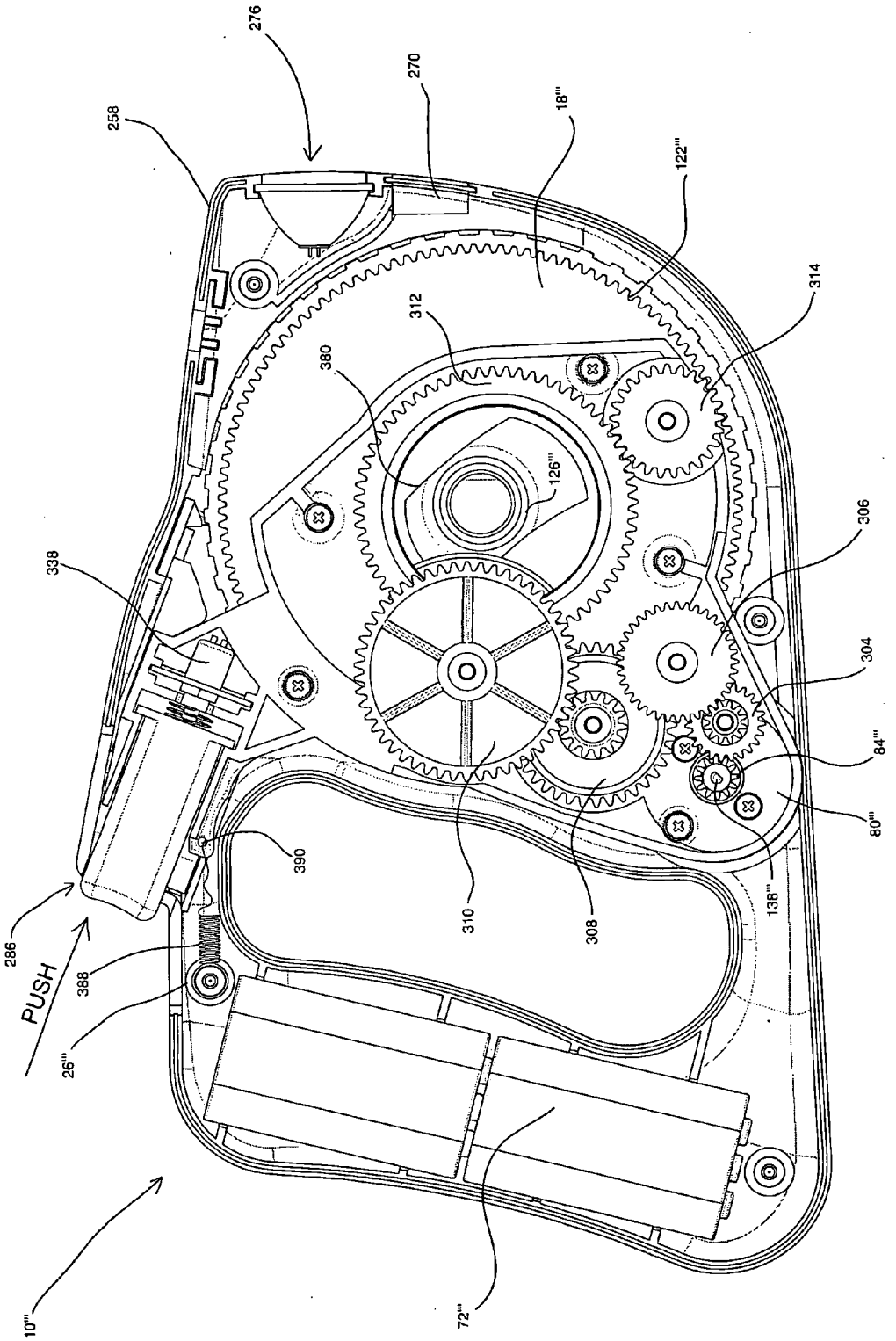
276
270
258
18'''
122'''
314
312
380
126'''
306
338
304
84'''
80'''
390
310
308
138'''
286
PUSH
388
26'''
10'''
72'''

FIG. 13

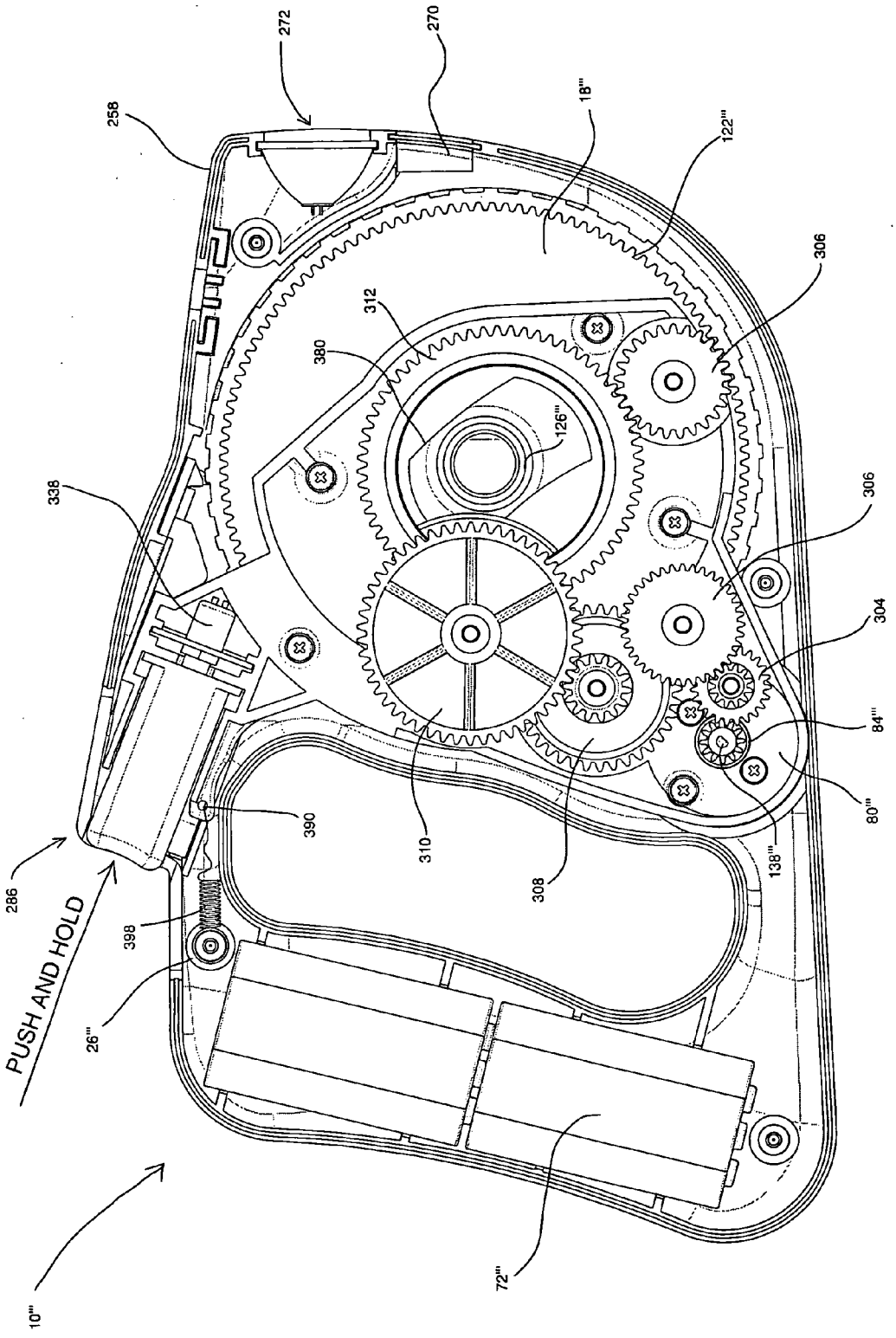
272
270
258
18'''
122'''
306
312
380
126'''
338
306
304
84'''
80'''
390
310
308
138'''
286
PUSH AND HOLD
398
26'''
10'''
72'''

FIG. 14

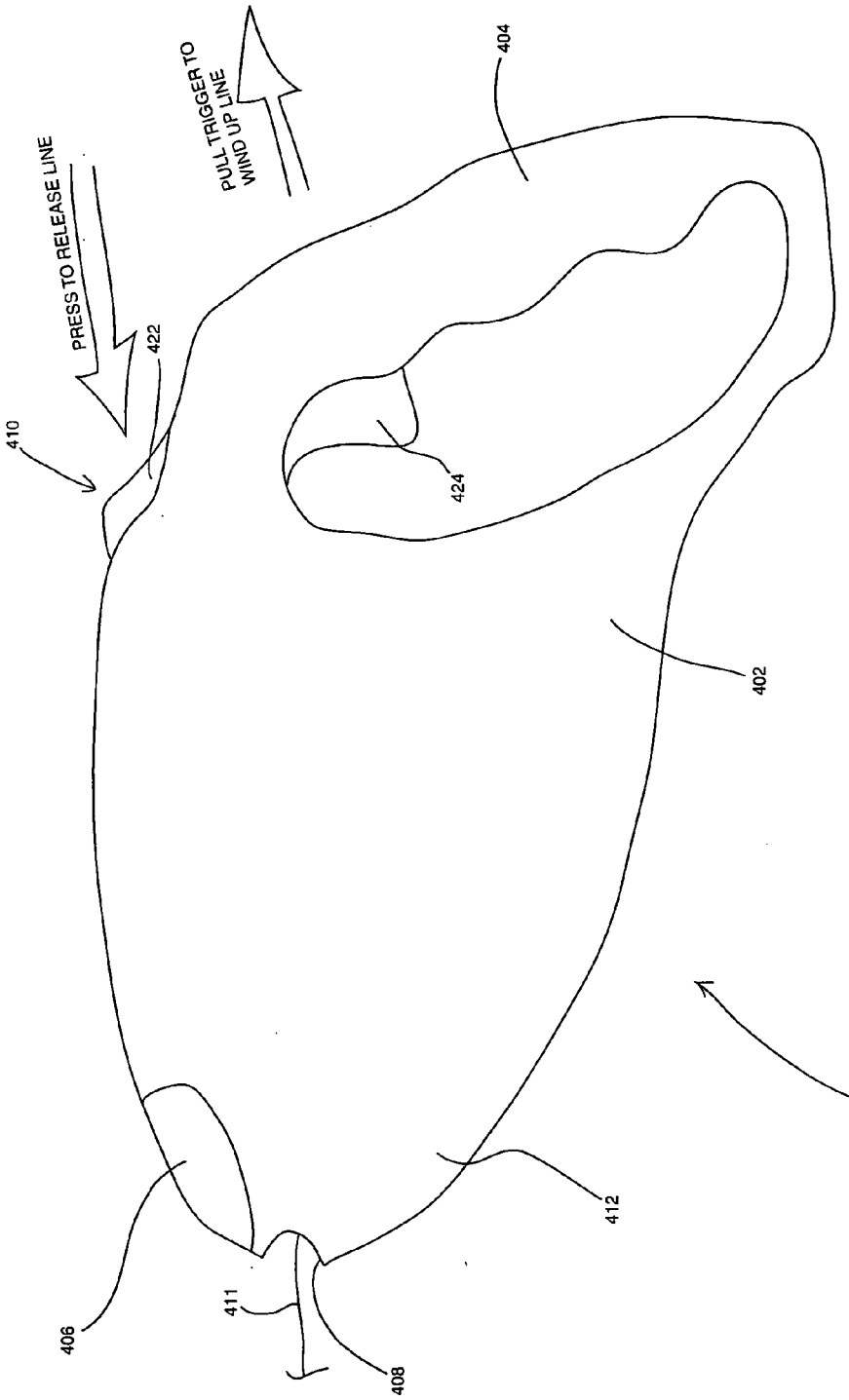
PULL TRIGGER TO WIND UP LINE
PRESS TO RELEASE LINE
404
422
410
424
402
400
412
406
411
408

FIG. 15

MOTORIZED PET LEASH ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from U.S. Provisional Patent Application Ser. No. 60/662,698 filed Mar. 17, 2005 and is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] The present invention relates, generally, to a restraining device for a pet. More particularly, the present invention relates to a motorized, retractable pet leash that allows the user to manually control a pet without injury.

[0003] Pet owners commonly restrain their pets using leashes. The typical leash includes an elongated strap or braided nylon cord having, at one end, a loop or handle for grasping by the pet owner and, at the other end, a clasp that attaches the leash to the pet's collar. One common type of leash is the retractable leash. This design employs a housing having a mechanism (e.g. a spring-driven mechanism) for automatically retracting the leash into the housing for shortening the leash cord and for storing the leash cord when the leash is not in use. Such leashes can provide effective means of restraining a pet during simple "walks" or during training.

[0004] Retractable pet leashes generally enable the user having a pet tethered to a leash cord to fluidly adapt to changing spatial relationships between the user and the pet. Conventionally, retractable leash assemblies generally operate in two modes. A first mode provides a spring loaded tension on the retractable leash cord. The spring-loaded tension causes the leash cord to retract as slack develops, extends as the owner allows the pet to roam at a further distance, and stops the leash from dragging on the ground. A second, locking, mode removes the spring-loaded tension and stops the leash from either retracting or extending.

[0005] One disadvantage of traditional retractable pet leash assemblies is that the switching mechanism for selecting between a spring-loaded tension mode and a locked mode of operation is somewhat clumsy to operate. Some prior systems require a constant force to be applied to a braking mechanism to maintain the leash cord in a locked mode. In other conventional retractable pet leash assemblies, the locked mode is maintained by applying a locking pin to the brake mechanism. Quite often such leash assemblies require the use of both hands, or require difficult single-handed motions to transit between the locked and spring-loaded tension modes of operation.

[0006] Moreover, conventional leash assemblies do not enable a pet owner to retract the leash into the housing when the pet exerts more tension on the leash than the retraction force supplied by the spring bias on the spool on which the leash is wrapped. The pet owner has to manually grasp the leash to pull the pet towards him, causing slack in the line, thereby allowing the spring driven mechanism to retract the leash. But, grasping the leash may injure the owner's hand, particularly when the pet is pulling strongly on the leash.

[0007] In light of the foregoing, it becomes evident that there is a need for a retractable pet leash assembly that would provide a solution to one or more of the deficiencies from which the prior art and/or conventional leash assemblies have suffered. Accordingly, the present invention provides a new and improved ergonomic motorized retractable pet leash assembly.

BRIEF DESCRIPTION OF THE INVENTION

[0008] In an exemplary embodiment of the present disclosure, a motorized pet leash assembly is provided.

[0009] More particularly, in accordance with this aspect of the present invention, a motorized dog leash comprises a housing, a battery mounted to the housing, and a motor mounted to the housing and electrically connected to the battery. A gear train is connected to an output shaft of the motor. A spool is rotatably mounted to the housing and engaged with the gear train. A leash is selectively wound on the spool, the leash including a distal end which protrudes from the housing. A trigger selectively actuates the motor to rotate the spool.

[0010] In accordance with another aspect of the present invention, a motorized dog leash comprises a housing, a battery mounted to the housing, and a spool mounted to the housing, the spool having an axis of rotation. A spooling mechanism enables a powered retraction of the leash. The spooling mechanism includes a motor and a gear train. The motor is mounted to the housing and electrically connected to the battery, the motor having an axially rotated output drive shaft. The gear train is connected to the drive shaft for rotation therewith. The spooling mechanism is pivotable about the output drive shaft of the motor around a pivot axis for allowing the gear train to be selectively engaged with the spool. A leash is at least partially wound about the spool. A trigger assembly selectively actuates the spooling mechanism for extension or retraction of the leash.

[0011] In accordance with yet another aspect of the present invention, a motorized dog leash comprises a housing, a battery compartment located in the housing for accommodating a battery, and a spool rotatably mounted in the housing. The spool includes at least one flange and a lip including teeth. A spooling mechanism enables a powered retraction of the leash. The spooling mechanism includes a motor, a gear train and a support member. The motor is electrically connected to the battery and has an axially rotated output drive shaft. The gear train includes at least one drive gear and at least one compound gear. The gear train is connected to the drive shaft for rotation therewith. The support member is pivotable about the output drive shaft of the motor around a pivot axis for allowing the gear train to be selectively engaged with teeth of the lip of the spool. A leash is at least partially wound about the spool. A trigger selectively actuates the spooling mechanism for extension or retraction of the leash.

[0012] Still other non-limiting aspects of the present invention will become apparent from a reading and understanding of the description of the preferred embodiments hereinbelow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The present invention may take physical form in certain parts and arrangements of parts, preferred embodiments of which will be described in detail in this specification and illustrated in the accompanying drawings which form a part hereof.

[0014] FIG. **1** is a left side partial cross-sectional view of a motorized pet leash assembly according to a first embodiment of the present invention.

[0015] FIG. **2**A is a left side elevational view of the motorized pet leash assembly of FIG. **1**, with a housing half removed.

[0016] FIG. **2**B is a left side elevational view of the motorized pet leash assembly of FIG. **1**, with a housing half removed showing a power spring.

[0017] FIG. **3** is a right side elevational view of the motorized pet leash assembly of FIG. **1**, with a housing half removed.

[0018] FIG. **4** is an enlarged cross-sectional view of a trigger assembly of the motorized pet leash assembly of FIG. **1**.

[0019] FIG. **5** is a schematic side perspective view of a spool mechanism of the motorized pet leash assembly of FIG. **1**.

[0020] FIG. **6** is a right side elevational view of a motorized pet leash assembly according to a second embodiment of the present invention, with a housing half removed.

[0021] FIG. **7** is a right side elevational view, partially broken away, of a motorized pet leash assembly according to a third embodiment of the present invention.

[0022] FIG. **8** is an enlarged top perspective view of a motor and gear housing of the motorized pet leash assembly of FIG. **7**.

[0023] FIG. **9** is a front perspective view of a motorized pet leash assembly according to a fourth embodiment of the present invention.

[0024] FIG. **10** is a rear perspective view of the motorized pet leash assembly of FIG. **9**.

[0025] FIG. **11**A is a front exploded perspective view of the motorized pet leash assembly of FIG. **9**.

[0026] FIG. **11**B is a rear exploded perspective view of a spooling mechanism of the motorized pet leash assembly of FIG. **9**.

[0027] FIG. **12** is an enlarged right side elevational view, partially broken away, of the motorized pet leash assembly of FIG. **9** showing a spool of the motorized pet leash assembly in a first freely rotating, condition.

[0028] FIG. **13** is a right side elevational view, partially broken away, of the motorized pet leash assembly of FIG. **12** showing the spool in a second condition engaging a gear train but with a motor not engaged.

[0029] FIG. **14** is a right side elevational view, partially broken away, of the motorized pet leash assembly of FIG. **12** showing the spool in a third condition, with the motor driving the spool.

[0030] FIG. **15** is a left elevational view of a motorized pet leash assembly according to a fifth embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0031] The description and drawings herein are merely illustrative of several embodiments of the invention. Various modifications and changes can be made to the components and arrangement(s) of components without departing from the spirit of the invention. Like numerals refer to like parts throughout the several views.

[0032] With reference to FIGS. **1-3**, a motorized pet leash assembly **10** according to a first embodiment is illustrated. The leash assembly generally includes a length of leash **12**, such as a cord, rope, chain, and/or a webbing strip, and a housing **14**. The housing **14** includes an ergonomically handle or hand grip portion **16** which can be integrally fabricated with the housing and a spool **18** which houses a portion of a spooling mechanism **20** (FIG. **1**). The spooling mechanism includes a gear train and a motor and enables a powered retraction of the leash.

[0033] The housing **14** can be a plastic molded component and includes first and second halves **22** and **24** that may be secured together by suitable fasteners. In this embodiment, a plurality of corresponding bosses **26** extend outwardly from the two halves, each boss including an aperture **28** for receiving a fastener (not shown) which threadingly engages the aperture from the exterior of one of the first and second halves **22**, **24**. A leash opening **32** is provided in a forward facing portion **34** of the housing **14** to enable unhindered movement of the leash between the interior and exterior of the housing. An anti-wear ring **36**, which can be made from a lubricious material, such as nylon, can be mounted in the leash opening **32** for buffering the leash through the opening **32** to reduce the frictional wear on the leash due to the leash rubbing against the portion of the housing **14** defining the opening **32**. The anti-wear ring **36** can also inhibit the leash **12** from forcing the housing halves **22** and **24** apart during extension and retraction of the leash.

[0034] As best shown in FIG. **3**, the leash **12** can include a stop member **38** which may be permanently fixed to a portion of the leash. The stop member includes a flange portion and a cylindrical portion having an outer diameter smaller than an inner diameter of the leash opening **32** and the anti-wear ring **36**. The flange portion of the stop member has a greater diameter than the opening **32** in the housing **14** such that the flange portion is stopped by the housing **14**.

[0035] With continued reference to FIGS. **1** and **3**, the housing **14** further includes an opening **39** provided for passage of a trigger assembly **40** that activates the spooling mechanism **18** for extension or retraction of the leash **12**. As shown in FIG. **4**, the trigger assembly includes a cap button **42** operatively mounted to a stem **44**. In particular, the cap button includes an inwardly extending flange **46** having a top surface **48** which abuts against a bottom surface **50** of a collar **52** extending outwardly from a top portion of the stem **44**. Extending from an inner top surface of the cap button **42** into an inner channel **54** of the stem is a projection **56** adapted to slidingly receive a spring **60**. The spring is positioned in a compressed state between the inner top surface of the cap button and a channel shelf **62**. Thus, the spring outwardly biases the cap button. A switch **66**, which actuates the spool mechanism **18**, is mounted to a bottom surface **68** of the channel **54**. To engage the switch, the cap button **42** is pushed downwardly onto the stem **44** thereby moving the projection **54** into contact with the switch. The switch **66** is electrically connected to batteries (FIG. **3**) **72** mounted in the housing **14**, which provide power to a motor **80**.

[0036] The location of the trigger assembly **40** enables a user to actuate the trigger assembly with a thumb, while using the remaining fingers of the grasping hand to hold onto the grip portion **16**. Actuating the trigger assembly **40** inhibits the leash **12** from extending from the housing **14** and actuates the spool mechanism **20**, which retracts the leash into the housing **14**.

[0037] With continued reference to FIG. **1**, a leash stop lock button **70** can be mounted to the housing **14**, adjacent the trigger assembly **40**. The spatial relationship of these two elements is more clearly illustrated in the embodiment disclosed by FIG. **10**. The feature of the leash stop lock button **70** will be discussed in greater detail below with reference to a fourth embodiment of the motorized pet leash assembly **10**. The leash stop lock button can be located proximate to the handle grip portion **16** and operates in a first locked position to lock the spool **18**, and in a second unlocked position that enables the spool to freely rotate. The trigger assembly **40** and the leash stop lock button **70** can be positioned proximate to each other so that the same hand can grasp the grip portion, actuate the trigger assembly with one finger, and operate the leash stop lock button. The location of the leash stop lock button **70** enables easy operation with the thumb of the grasping hand, thereby leaving the user's other hand completely free.

[0038] With reference again to FIG. **1**, the motor **80** of the spooling mechanism **18** includes a drive shaft **82** and a spur gear **84** securely mounted to an end of the drive shaft. The spooling mechanism further includes a gear train comprising a first gear **88** and a plurality of second or compound gears **90** and third or connecting gears **92**. The second and third gears have a general planetary arrangement. Each compound gear is smaller in diameter than the first gear and includes a small gear portion **96** concentrically secured to a large gear portion **98**. In the present embodiment, five compound gears (**90***a* through **90***e*) and two connecting gears **92** are provided. However, it should be appreciated that more or less than five compound gears and two connecting gears can be implemented to achieve the desired gear reduction. In one embodiment, a 500 to 1 gear reduction is obtained.

[0039] In operation, and as stated above, the trigger assembly actuates the motor **80** which, in turn, rotates the spur gear **84**. The spur gear actuates the larger first gear **88** thereby providing a high gear ratio between the spur gear and the first gear. The first gear **88**, in turn, actuates the plurality of compound gears **90** and connecting gears **92**. In particular, the first gear **88** engages large gear portion **98***a* thereby actuating compound gear **90***a*. Small gear portion **96***a* of compound gear **90***a* engages large gear portion **98***b* thereby actuating compound gear **90***b*. Small gear portion **96***b* of compound gear **90***b* actuates one of the connecting gears **92** which, in turn, engages large gear portion **98***c* thereby actuating compound gear **90***c*. The actuation of compound gear **90***d*, the second connecting gear **92** and compound gear **90***e* is similar to that described above. As shown in FIG. **1**, compound gear **90***e* actuates the spool **18**. As the spool rotates in a counterclockwise direction, the leash **12**, which has one end secured to a hub **108** of the spool, retracts and is wound or coiled about the hub. As mentioned, the gear arrangement of the present embodiment can provide approximately a 500 to 1 gear reduction. It can be appreciated by one skilled in the art that such a gear reduction will allow the motor **80**, which can be a conventional fractional horsepower electric motor powered by conventional batteries **72**, to retract the leash **12**, even when tethered to a large pet.

[0040] With reference to FIG. **5**, extending from the hub **108** are first and second flanges **110** and **112**, a periphery of both flanges including teeth **114** and **116**, respectively. Extending outwardly from the second flange **112** is a lip **120** including teeth **122** disposed radially about an inner surface **124**. The teeth **122** are engaged by the small gear portion **96***e* of compound gear **90***e*. As shown in FIG. **2**A, a portion of the hub **108** is slightly offset from the first flange **110** thereby forming a cavity **125**. As shown in FIG. **3**, a hollow stem **126** extends outwardly from the second flange **116**, a longitudinal axis of the stem being coincident with a rotational axis of the spool **18**. The spool **18** includes a mounting opening **128** adapted to rotatably receive a shaft portion (not shown) extending from the second half **24** of the housing **14**. Thus, the spool can freely rotate in the housing.

[0041] With reference again to FIG. **3**, the spooling mechanism **20** (not visible) is mounted to a support member **130**, which can be a plate. The support member includes an elongated opening **132** which allows the stem **126** of the spool **18** to protrude therethrough. The support member **130** is pivotable about the drive shaft **82** of the motor **80**, around a pivot axis **138**. As will be described in more detail below with reference to a fourth embodiment of the motorized pet leash assembly **10**, the support member, which can be a gear train housing, allows the spooling mechanism **20** to be selectively engaged with the spool **18** as the trigger assembly **40** is being depressed.

[0042] It should be appreciated that the spool **18** can be spring biased which enables the spool to freely retract any slack in the leash **12**. As shown in FIG. **2**B, the hub **108** can include a power spring **134** dimensioned to fit within the cavity **125** (FIG. **2**A). A radially outer end of the power spring can attach to a portion of the hub **108** to fasten the power spring in the cavity **125**. A radially inner end of the power spring can attach to one of the stem **126** and the shaft portion extending from the second half **24** of the housing **14**. In this embodiment, the power spring **134** is secured to the stem **126**. The power spring **134** is initially coiled to spring bias the spool **18** to retract the leash **12**. Additionally, as the spool **18** rotates to extend the leash **12** out of the housing **14**, the power spring **134** coils further, thereby providing additional retracting bias as the extended portion of the leash increases. This is conventional. Alternatively, the powered retraction mechanism disclosed herein can be used to wind the leash **12** back on the spool **18** after the tethered pet has played out the leash.

[0043] With continued reference to FIGS. **1**-**2**B, a contact arm **136** can be secured to the support member **130** near the leash opening **32**, for rotating the spooling mechanism **20** out of engagement with the spool **18**. Particularly, as the leash **12** is being retracted into the housing **14** and coiled about the spool **18**, a rear end of the stop member **38** will enter the leash opening **32**. As the stop member rear end engages the contact arm **136**, it will cause the support member **130** to rotate about the pivot axis **138** thereby moving compound gear **90***e* out of engagement with the teeth **122** of the spool **18**.

[0044] As shown in FIGS. **2**A-**3**, a light assembly **140** can be pivotally mounted to a top portion **142** of the housing **14**

via a pivot pin **144**. The light assembly includes a light bulb **146**, a clear lens **148** and a reflector **150**. The light assembly **140** can be operated by a contact switch (not shown). The contact switch can be electrically connected to the batteries **72** such that as the light assembly is being pivoted upward, power will be supplied to the light bulb thus illuminating the light assembly **140**.

[**0045**] Similar to the aforementioned embodiment, a second embodiment is shown in FIG. **6**. Since most of the structure and function is substantially identical, reference numerals with a single primed suffix (') refer to like components (e.g. the motorized pet leash assembly is referred to by reference numeral **10'**), and new numerals identify new components in the additional embodiment.

[**0046**] As shown in FIG. **6**, a spring **170** can be secured to a tab **172** of the support member **130'** at one end and a pin **174** extending from the second half **26'** of the housing **14'** near the handle **16'**. As described above, to actuate the spooling mechanism **20'**, a user depresses the trigger assembly **40'**. This action will pivot the support member **130'** about the stem **126'** of the spool **18'** thereby bringing the compound gear (not shown) of the spooling mechanism **20'** into contact with the spool **18'**. Once the trigger assembly is released, the spring retracts the spooling mechanism, which causes the spooling mechanism to pivot about the stem of the spool **18'**, out of engagement with the spool thereby allowing the spool to freely rotate within the housing **14'**.

[**0047**] Similar to the aforementioned embodiment, a third embodiment is shown in FIGS. **7** and **8**. Since most of the structure and function is substantially identical, reference numerals with a double primed suffix (") refer to like components (e.g., the motorized pet leash assembly is referred to by reference numeral **10"**), and new numerals identify new components in the additional embodiment.

[**0048**] With reference to FIGS. **7** and **8**, the motorized pet leash assembly includes a spooling mechanism **190** mounted to a support member **192** having a first half **194** and a mating second half (not shown). A plurality of bosses **198** including mounting apertures **200** extend from the first half. It should be appreciated that the second half includes a plurality of openings which correspond with the apertures **200** of the bosses **198**. Conventional fasteners (not shown) can be used to secure the first half **194** to the second half.

[**0049**] The spooling mechanism **190** includes a motor **80"** having a spur gear **84"** rotatably mounted on a drive shaft **82"**, first and second compound gears **202** and **204** and first and second drive gears **206** and **208**. Similar to the first embodiment, the first compound gear **202** includes a small gear portion **210** concentrically secured to a large gear portion **212**. The second compound gear **204** also includes a small gear portion (not shown) concentrically secured to a large gear portion **214**.

[**0050**] In operation, the spooling mechanism is actuated by a trigger assembly **220**, the trigger assembly actuating the motor **80"** which, in turn, rotates the spur gear **84"**. The spur gear engages the large gear portion **212** which actuates the first compound gear **202** thereby providing a high gear ratio between the spur gear and the first compound gear. Small gear portion **210** of the first compound gear **202** engages the large gear portion **214** thereby actuating the second larger compound gear **204**. The small gear portion (not shown) of the second compound gear **204** actuates the first drive gear **206** which, in turn, actuates the second smaller drive gear **208**. As shown in FIG. **7**, the second drive gear engages the teeth **122"** thereby actuating the spool **18"**. As the spool rotates in a counterclockwise direction, the leash **12"**, which has one end secured to the spool, retracts and is wound about the spool. Thus, the gear arrangement of the present embodiment can also provide approximately a 500 to 1 gear reduction.

[**0051**] With reference to FIG. **8**, the trigger assembly **220**, which is housed in a recess **222** defined by the first half **194** and the second half (not shown) of the support member **192**, includes a cap button **224**, a contact plate **226** and a switch assembly **228**. A pair of fingers **230** slidably secure the contact plate **226** against a surface **232** of the first half **194** of the support member **192**. The switch assembly **228**, which actuates the spool mechanism **18"**, is mounted to the support member **192**. To engage the switch assembly, the cap button **224** is pushed downwardly thereby moving the contact plate **226** into contact with the switch assembly. The switch assembly **228** is electrically connected to batteries **72"** housed in the housing **14"** which also provide power to the motor **80"**.

[**0052**] Similar to the aforementioned embodiment, a fourth embodiment is shown in FIGS. **9-14**. Since most of the structure and function is substantially identical, reference numerals with a triple primed suffix (''') refer to like components (e.g., the motorized pet leash assembly is referred to by reference numeral **10'''**), and new numerals identify new components in the additional embodiment.

[**0053**] With reference to FIGS. **9-11**A, the leash assembly **10'''** includes a housing **250** having an ergonomically shaped handle or hand grip **252** which can be integrally fabricated with the housing and a spool **18'''** which houses a motor and gear train portion of a spooling mechanism **254**. The spooling mechanism enables retraction of a leash (not shown). The housing **250** can be a plastic molded component and can be comprised of first and second halves **256** and **258** that may be secured together by suitable fasteners. In this embodiment, a plurality of mating bosses **26'''** extend outwardly from the two halves, each boss including an aperture **28'''** for receiving a fastener F.

[**0054**] A leash opening **264** is provided at a forward facing portion **266** of each half **256** and **258** of the housing to enable unhindered movement of the leash between the interior and exterior of the housing **250**. An anti-wear ring **270**, which can be made from a lubricious material, such as nylon, includes an opening **272** and is mounted in the leash opening **264** for buffering the leash through the opening **264** to reduce the frictional wear on the leash due to the leash rubbing against housing **250**. The anti-wear ring **36** can also inhibit the leash from forcing the housing halves **256** and **258** apart during extension and retraction of the leash.

[**0055**] With reference to FIG. **11**A, located adjacent the leash opening **272** is a light assembly **276** comprising a light bulb **278**, a clear lens **280** and a reflector **282**. The light assembly can be operated by a trigger assembly **286** located near the handle portion **252** of the housing **250**. The power supply used to power the light assembly **276** may comprise conventional batteries **72'''** in a battery pack contained in a battery compartment **290** defined in a handle of the device. It is appreciated that the power supply may also include a photovoltaic cell and the like.

[0056] As previously described with respect to the first embodiment of the present invention, the spool **18'''** includes a hub **108'''** and first and second flanges **110'''** and **112'''** extending radially from the hub, a periphery of both flanges including teeth **114'''** and **116'''**, respectively. Extending outwardly from the second flange **112'''** is a lip **120'''** including teeth **122'''** disposed radially about an inner surface. As shown in FIGS. **12-14**, the teeth **122'''** are engaged by the spooling mechanism **254**. A portion (not visible) of the hub **108'''** is slightly offset from the first flange **110'''** thus defining a recess (not visible) for housing a washer **292**. As shown in FIG. **11**A, a hollow stem **126'''** extends outwardly form the second flange **116'''**, a longitudinal axis of the stem being coincident with a rotational axis of the spool **18'''**. The spool **18'''** includes a mounting opening (not shown) adapted to rotatably receive a shaft portion **294** extending from the second half **258** of the housing **14'''**. Thus, the spool can freely rotate in the housing.

[0057] Referring still to FIG. **11**A, located above the handle portion **252** is a leash stop lock button **70'''** for controlling the amount of leash that is extended or retracted within the housing **250**. The leash stop lock button **70'''** is located proximate to the handle portion **252** such that when a user is gripping the handle portion, the stop lock button may be activated by a finger of the same hand holding the handle portion. The leash stop lock button **70'''** is connected to an arm **298** and a planar member **300**. The planar member includes a pair of projections **302** located on a bottom surface for engaging the teeth **114'''** and **116'''** of the spool **18'''** about which the leash is coiled. The leash stop lock button **70'''** can be biased by a spring (not shown). In the locked position, the projections **302** of the planar member **300** engage the teeth **114'''** and **116'''** of the spool **18'''** and prevent the movement of the spool thereby limiting the amount of leash that extends from the housing **250**. In the unlocked position, the projections **302** of the planar member **300** are clear of the teeth **114'''** and **116'''** allowing the spool **18'''** to freely rotate.

[0058] With reference now to FIGS. **11**B-**14**, the spooling mechanism **254** includes a motor **80'''** having a spur gear **84'''** rotatably mounted on a drive shaft **82'''**, first, second, third and fourth increasingly larger compound gears **304**, **306**, **308**, and **310**, respectively, and first and second drive gears **312** and **314**. Similar to the third embodiment, the compound gears include a small gear portion concentrically secured to a large gear portion.

[0059] In operation, the spooling mechanism is actuated by the trigger assembly **286**, the trigger assembly actuating the motor **80'''** which, in turn, rotates the spur gear **84'''**. The spur gear engages the large gear portion **316** of the first compound gear **304** thereby providing a high gear ratio between the spur gear and the first compound gear. The small gear portion **318** of the first compound gear **304** engages the large gear portion **320** thereby actuating the second compound gear **306**. The small gear portion (not shown) of the second compound gear **306** engages the large gear portion **322** of the third compound gear **308** thereby actuating the third compound gear. The small gear portion **324** of the third compound gear **308** engages the large gear portion **326** of the fourth compound gear **310** thereby actuating the fourth compound gear. The small gear portion (not shown) of the fourth compound gear **310** actuates the first drive gear **312** which, in turn, actuates the second smaller drive gear **314**. As will be described in further detail below, the second drive gear **314** engages the teeth **122'''** thereby actuating the spool **18'''**. As the spool rotates in a counterclockwise direction, the leash (not shown), which has one end secured to the spool, retracts and is coiled about the spool. Thus, the gear arrangement of the present embodiment can also provide approximately a 500 to 1 gear reduction. Of course, other gear reduction ranges are also contemplated, depending on the required power for the spool **18'''**. That, in turn, is dependent on the size of the pet.

[0060] As previously mentioned, such a gear reduction will allow the motor **80'''**, which can be a conventional fractional horsepower electric motor powered by conventional batteries **72'''**, to retract the leash, even when tethered to a pet pulling in the opposite direction. Thus, this gear reduction enables enable a pet owner to retract the leash into the housing **250** when the pet exerts more tension on the leash than the retraction force supplied by the spring bias on the spool **18'''** on which the leash is wrapped.

[0061] Referring to FIGS. **11**B and **12**, the trigger assembly **286**, which is housed in a channel **328** defined by a first half **330** and a second half **332** of a gear housing **334**, includes a cap button **336** and a switch assembly **338**. The switch assembly **338** is electrically connected to the batteries **72'''** which also provide power to the motor **80'''**.

[0062] The cap button **336** includes a flange **344** which abuts against a bottom surface **346** of the channel **328**. A projection (not shown) can extend from an inner top surface of the cap button **336** into the channel **328** and is dimensioned to receive a spring **348**. The spring is positioned in a compressed state between the inner top surface of the cap button and a channel shelf **350**. Thus, the spring outwardly biases the cap button. The switch assembly **338**, which actuates the spool mechanism **254**, is also mounted in the channel **328**. To engage the switch assembly **338**, the cap button **336** is depressed thereby moving the projection into contact with the switch assembly.

[0063] With continued reference to FIG. **11**B, the gear housing **334**, which is pivotable about a pivot axis **138'''** defined by the drive shaft **82'''** of the motor **80'''**, can be a plastic molded component and the first and second halves **330** and **332** of the gear housing **334** may be secured together by suitable fasteners. In this embodiment, a plurality of corresponding bosses **356** extend outwardly from the second half **332**, each boss including an aperture **358** for receiving a fastener F' which threadingly engages the aperture through recessed openings **360** located on the first half **330**.

[0064] The first half **330** of the gear housing **334** includes a motor housing **362** and a recess **364** having an opening **366**. The recess is dimensioned to receive the second drive gear **314** and the opening **366** allows a portion of the second drive gear to extend out of the gear housing for engaging the spool **18'''** (FIGS. **12-14**). The second half **332** further includes gear mounts **370** having apertures **372** dimensioned to receive gear shafts **374** for each compound gear and each drive gear. Note that the large second drive gear **312** is rotatably mounted on a collar **373** extending away from a face of the first gear housing half **330**.

[0065] As shown in FIGS. **11**A and **11**B, the first and second halves **330** and **332** of the gear housing **334** also

include corresponding elongated openings **380** which allow the spooling mechanism **254** to be mounted on the stem **126'''** of the spool **18'''**.

[**0066**] The positioning of the spooling mechanism **254** relative to the spool **18'''** is shown in FIGS. **12-14**. As shown in FIG. **12**, the trigger assembly **286** is not depressed and the second drive gear **314** is spaced from the teeth **122'''** of the spool **18'''**. As such, in this first position, the spool can freely rotate in the housing **250**.

[**0067**] As shown in FIG. **13**, the trigger assembly **286** is only partially depressed so that the switch assembly **338** is not engaged. In this second position, the spooling mechanism **254**, again which is mounted on the stem **126'''** of the spool **18'''**, the stem extending through the corresponding elongated openings **354** in the first and second halves **330** and **332** of the gear housing **334**, pivots about the pivot axis **138'''**. The second drive gear **314** will engage the teeth **122'''** of the spool **18'''** thereby locking the spool in a fixed position. As such, the leash will not extend any farther from the housing **250**.

[**0068**] As shown in FIG. **14**, the trigger assembly **286** is fully depressed and held in this depressed state so that the switch assembly **338** is engaged. In this third position, the motor **80'''** will actuate thereby actuating the compound gears **304**, **306**, **308** and **310** and the drive gears **312** and **314** of the spooling mechanism **254**. This actuation will, in turn, cause the second drive gear **314** to actuate the spool **18'''** causing the spool to rotate in a counterclockwise direction. The leash, which is secured to the spool, will retract and coil around the spool.

[**0069**] A spring **388** can be secured to a tab **390** of the gear housing **334** and one of the bosses **26'''** extending from the second half **258** of the housing **250** near the handle **252**. As the trigger assembly **286** is released from the above described third position, the spring **388** causes the spooling mechanism **254** to pivot about the pivot axis **138'''** into the first position and out of engagement with the spool **18'''** thereby allowing the spool to again freely rotate within the housing **250**.

[**0070**] Similar to the aforementioned embodiment, a fifth embodiment of a motorized pet leash assembly **400** is shown in FIG. **15**. In this embodiment, the leash assembly includes a housing **402** having an ergonomically shaped handle or hand grip **404** which can be integrally fabricated with the housing. The housing **402** can be a plastic molded component. The housing includes a light assembly **406** located adjacent a leash opening **408**. The light assembly can be operated by a switch, not shown. Alternatively, the light can be selectively actuated by a trigger assembly **410** located near the handle portion **404** of the housing **402**. The trigger assembly selectively allows a pet to play out a leash **411** wound on a spool (not visible) in the housing **402**. The power supply used to power the light assembly **406** may comprise conventional batteries (not visible) contained in a battery compartment (not visible) located in the housing.

[**0071**] In this embodiment, the device can also include an alarm. As shown in FIG. **15**, an alarm grill **412** can be located at the front end of the housing **402**. A volume control (not shown) can be located on the side of the housing for controlling the volume of the alarm. Triggering the alarm can be accomplished by a switch, not shown, mounted on the housing **402**. Such an alarm may prove useful in scaring away other pets, which may be bothering the device holder's pet. Actuating the alarm may also flash the light **406** to scare such other pets, or for other purposes.

[**0072**] The trigger assembly **410**, which is operatively coupled to similar components described in detail above (e.g. a spool and a spooling mechanism), includes a first portion **422** and a second portion **424**. To allow a leash (not shown) to extend freely from the housing **402**, the first portion **422** is pressed. It can be appreciated that in this position, the spooling mechanism is not engaged with the spool. In order to retract the leash, the second portion **424** is pulled thereby actuating the spooling mechanism which engages the spool causing the spool to rotate in a counterclockwise direction.

[**0073**] The exemplary embodiments have been described with reference to the preferred embodiments. Obviously, modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the exemplary embodiments be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

What is claimed is:

1. A motorized dog leash comprising:

a housing;

a battery mounted to the housing;

a motor mounted to the housing and electrically connected to the battery;

a gear train connected to an output shaft of the motor;

a spool rotatably mounted to the housing and engaged with the gear train;

a leash selectively wound on the spool, the leash including a distal end which protrudes from the housing; and

a trigger selectively actuating the motor to rotate the spool.

2. The motorized dog leash of claim 1, wherein the gear train includes at least one drive gear and at least one compound gear for achieving a desired gear reduction.

3. The motorized dog leash of claim 2, wherein the gear train comprises planetary arrangement.

4. The motorized dog leash of claim 3, wherein the at least one compound gear is smaller in diameter than the drive gear.

5. The motorized dog leash of claim 1, wherein the gear train obtains approximately a 500 to 1 gear reduction.

6. The motorized dog leash of claim 1, wherein the spool includes:

a hub, at least one radial flange attached to the hub,

a lip extending outwardly from the at least one flange, the lip and the at least one flange defining a cavity for housing a portion of the gear train, the lip including teeth disposed about an inner surface for engaging the gear train, and

a stem extending outwardly from the at least one flange, a longitudinal axis of the stem being coincident with an axis of rotation of the spool.

7. The motorized dog leash of claim 6, further comprising a support member, the support member being pivotable about the stem of the spool thereby bringing the gear train into contact with the teeth of the lip of the spool.

8. The motorized leash of claim 7, further comprising a contact arm secured to the support member, wherein as the leash is being wound about the spool, a portion of the leash engages the contact arm causing the support member to rotate out of engagement with the spool.

9. The motorized dog leash of claim 1, further comprising a support member, the support member being pivotable about the drive shaft of the motor around a pivot axis, the support member allowing the gear train to be selectively engaged with the spool as the trigger is being depressed.

10. The motorized leash of claim 1, further comprising a leash stop lock button mounted to the housing, adjacent the trigger, the leash stop lock operating in a first locked position to lock the spool, and in a second unlocked position that enables the spool to freely rotate.

11. The motorized dog leash of claim 11, wherein the leash stop lock button engages teeth disposed about a periphery of the spool.

12. The motorized dog leash of claim 1, wherein spool is spring biased enabling the spool to freely retract any slack in the leash.

13. A motorized dog leash comprising:

a housing;

a battery mounted to the housing;

a spool mounted to the housing, the spool having an axis of rotation;

a spooling mechanism for enabling a powered retraction of the leash, the spooling mechanism including a motor mounted to the housing and electrically connected to the battery, the motor having an axially rotated output drive shaft, and a gear train connected to the drive shaft for rotation therewith, the spooling mechanism being pivotable about the output drive shaft of the motor around a pivot axis for allowing the gear train to be selectively engaged with the spool;

a leash at least partially wound about the spool; and

a trigger assembly selectively actuating the spooling mechanism for extension or retraction of the leash.

14. The motorized leash of claim 13, wherein the gear train includes at least one drive gear and at least one compound gear for achieving a desired gear reduction.

15. The motorized dog leash of claim 13, wherein the gear train obtains approximately a 500 to 1 gear reduction.

16. The motorized dog leash of claim 13, wherein the spool includes:

a hub,

first and second radial flanges attached to opposed ends of the hub,

a lip extending axially from the second flange, the lip including teeth disposed about an inner surface for engaging the gear train, and

a stem extending axially from the second flange, a longitudinal axis of the stem being coincident with an axis of rotation of the spool.

17. The motorized dog leash of claim 16, wherein the spooling mechanism includes a support member, the support member including an elongated opening for receiving the stem, the stem limiting the pivotal movement of the support member.

18. A motorized dog leash comprising:

a housing;

a battery compartment located in the housing for accommodating a battery;

a spool rotatably mounted in the housing, the spool including at least one flange and a lip including teeth;

a spooling mechanism for enabling a powered retraction of the leash, the spooling mechanism including:

a motor electrically connected to the battery, the motor having an axially rotated output drive shaft,

a gear train including at least one drive gear and at least one compound gear, the gear train being connected to the drive shaft for rotation therewith, and

a support member pivotable about the output drive shaft of the motor around a pivot axis for allowing the gear train to be selectively engaged with teeth of the lip of the spool;

a leash at least partially wound about the spool; and

a trigger selectively actuating the spooling mechanism for extension or retraction of the leash.

19. The motorized dog leash of claim 18, wherein the spool further includes a stem extending outwardly from the at least one flange.

20. The motorized dog leash of claim 19, wherein the support member includes an elongated slot for receiving the stem of the spool, the stem limiting the pivotal movement of the support member.

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